

# Claims

- [c1] Claim 1 [previously Claim 16]: A method for operating a reciprocating internal combustion engine equipped with a lean NO<sub>x</sub> trap on gaseous hydrogen, comprising the steps of:
- operating the engine at an equivalence ratio of about 0.15 to 0.65, except when purging the lean NO<sub>x</sub> trap;
- and
- operating at an equivalence ratio of about 1.1 when purging the lean NO<sub>x</sub> trap.
- [c2] Claim 2 [previously Claim 17]: A method according to Claim 1 [16], further comprising the step of operating the engine with the mass of EGR being approximately equal to the mass of air and fuel when the lean NO<sub>x</sub> trap is being purged.
- [c3] Claim 3 [previously Claim 18]: A method according to Claim 1 [16], further comprising the step of operating the engine with the mass of EGR being approximately equal to the mass of air and fuel when the lean NO<sub>x</sub> trap is being purged and when the engine is operating at or near maximum load.

- [c4] Claim 4 [previously Claim 19]: A method for operating a reciprocating internal combustion engine, comprising the steps of:  
providing substantially premixed air and hydrogen to a combustion chamber of the engine wherein said air and hydrogen are at an equivalence ratio of approximately unity; and  
providing residual gases to the combustion chamber, with the mass of the residual gases exceeding 40% of the total mass of gases provide to the combustion chamber.
- [c5] Claim 5 [previously Claim 20]: A method according to Claim 4 [19], wherein the residual gases comprise engine exhaust gas trapped in the combustion chamber from a prior combustion event and engine exhaust gas recirculated to the combustion chamber.
- [c6] Claim 6 [previously Claim 21]: A method according to Claim 4 [19], wherein the engine has a three-way catalyst disposed in an exhaust system connected to the engine.